

REMARKS

I. Introduction

Claims 1, 2, 4-51, and 54 and 55 are currently pending. Claims 3, 52, and 53 were previously cancelled and claims 2, 4, 5 and 8-53 were withdrawn by the Examiner following a restriction requirement.

Claims 1 and 6 have been amended to further define the subject matter, support for which is found throughout the specification, for example, on page 7, line 21-23 and page 34, line 23 to page 35, line 4. No new matter has been added.

For the following reasons this application should be allowed and the case passed to issue.

II. Claim Rejections Under 35 U.S.C. § 102(e)

Claims 1, 6, 7 and 54 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Saito U.S. Patent Application Publication No. 2008/0230916 (Saito '916). Applicants respectfully disagree. However, in an effort to expedite prosecution, claim 1 has been amended and now recites, in pertinent part,

“[a] semiconductor device comprising:
... a barrier metal film formed between the insulation film and the metal interconnect,
wherein the barrier metal film is a metal oxide film, and wherein the metal oxide film contains at least one of the elements forming the insulation film and is made of at least one selected from a group consisting of Zr, Hf, W, V, Mo, Os, Rh, Ir, Pd and Pt or any alloy thereof.

[Emphasis added].

Anticipation under 35 U.S.C. § 102 requires that “each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed Cir. 1987).

Saito '916 discloses a semiconductor device in which a second-layer interconnection 9L is formed by being buried in a plurality of interconnection grooves and is composed of a thin and thick conductor film. The interconnection layer 9L of Saito '916 is formed of tungsten and TiN (see, paragraph [0122] of Saito '916), and is asserted to correspond to the recited barrier film.

Thus, as interconnection layer 9L is not formed of a metal oxide film, at a minimum, Saito '916 does not disclose (expressly or inherently) a configuration, wherein **the barrier metal film is a metal oxide film**.

Moreover, as explained on page 35, lines 4-5 of the instant specification, such a configuration in which the barrier film is a metal oxide film maintains conductivity and therefore, a low resistance second barrier metal film can be formed.

Therefore, because Saito '916 does not disclose (expressly or inherently) a configuration in which a barrier metal film is a metal oxide film, as recited in claim 1, Saito '916 fails to anticipate the claim under 35 U.S.C. § 102. Accordingly, claim 1 is allowable over the cited prior art reference. Furthermore, claims 6, 7, 54 and 55 depend from and further define the subject matter of the claim and therefore should also be allowed.

Claims 1, 6, 7, 54 and 55 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Saito U.S. Patent Application Publication No. 2003/0109129 (Saito '129). Applicants respectfully disagree, however as discussed above, claim 1 has been amended and now recites in pertinent part, that **"the barrier metal film is a metal oxide film."** [Emphasis added].

At a minimum, the cited prior art does not disclose (expressly or inherently) a configuration, wherein **the barrier metal film is a metal oxide film**.

Rather, Saito '129 discloses a semiconductor device in which a metal film PM5a connects two interconnects. Saito '129 does not disclose (expressly or inherently) a configuration in which a barrier metal film is a metal oxide film, as recited in claim 1. The metal film PM5a of Saito '129 is formed of a TiN film (see, paragraph [0161] of Saito '129.

Thus, as barrier metal film PM5a is not formed of a metal oxide film, at a minimum, Saito '129 does not disclose (expressly or inherently) a configuration, wherein **the barrier metal film is a metal oxide film**. Accordingly, claim 1 is allowable over the cited prior art reference. Furthermore, claims 6, 7, 54 and 55 depend from and further define the subject matter of claim 1, and therefore are also allowable.

Claims 1, 6, 7, 54 and 55 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Ohtsuka U.S. Patent Application No. 2002/0019131. Applicants respectfully disagree. However, claim 1 has been amended and now recites, in pertinent part, that **“the barrier metal film is a metal oxide film.”** [Emphasis added].

At a minimum, the cited prior art does not disclose (expressly or inherently) a configuration, wherein **the barrier metal film is a metal oxide film**.

Ohtsuka discloses a nitride barrier layer (22), however Ohtsuka fails to disclose (expressly or inherently) a configuration in which a barrier metal film is a metal oxide film, as recited in claim 1. The barrier layer 22 is a nitride, (see paragraph [0052] of Ohtsuka).

Thus, as nitride barrier material 22 is not formed of a metal oxide film, at a minimum, Ohtsuka does not disclose (expressly or inherently) a configuration, wherein **the barrier metal film is a metal oxide film**.

Accordingly, claim 1 is allowable over the cited prior art reference.

Furthermore, claims 6, 7, 54 and 55 depend from and further define the subject matter of claim 1, and therefore are also allowable.

II. Conclusion

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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